AD-A009 173

NMCSSC SIMULATION FOR THE ASSESSMENT OF TACTICAL
NUCLEAR WEAPONS (SATAN II). SYSTEM DESCRIPTION.
CHANGE 3

Marvin Lautzenheiser, et al

National Military Command System Support Center
Washington, D. C.

5 January 1973

DEFENSE COMMUNICATIONS AGENCY
NATIONAL MILITARY COMMAND SYSTEM
SUPPORT CENTER
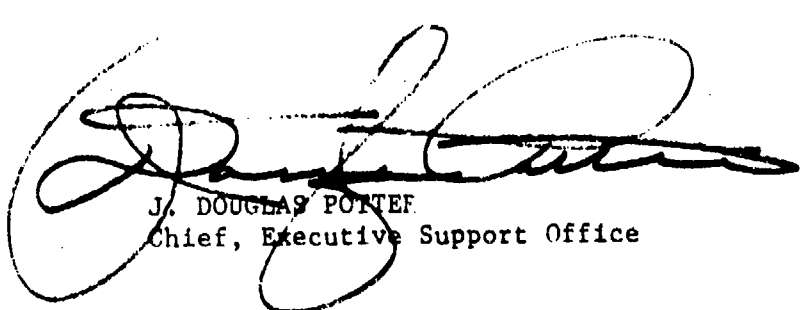#### WASHINGTON, D. C. 20301

IN REPLY
REFER TO: B235

2 April 1975

TO: RECIPIENTS

SUBJECT: Change 3 to Computer System Manual CSM 133-72, Simulation For The Assessment of Tactical Nuclear Weapons (SATAN II) System Description

1. Insert the enclosed change pages and destroy the replaced pages according to applicable security regulations.

2. A list of Effective Pages to verify the accuracy of this manual is enclosed. This list should be inserted before the title page.

3. When this change has been posted, make an entry in the Record of Changes.

FOR THE COMMANDER:

39 Enclosures
Change 3 pages

J. DOUGLAS POTTER
Chief, Executive Support Office

CII-3

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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)	2a. REPORT SECURITY CLASSIFICATION
National Military Command System Support Center/Anagram Corporation	UNCLASSIFIED
	2b. GROUP None

3. REPORT TITLE

SIMULATION FOR THE ASSESSMENT OF TACTICAL NUCLEAR WEAPONS (SATAN II)

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

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Bales, William B.   Eoff, David A.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
5 January 1975	375	34

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
Contract DCA100-70-C-0007 and Contract DCA100-74-C-0018	CSM SD 133-72
b. PROJECT NO.	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT

This document has been approved for public release; distribution is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	National Military Command System Support Center, BE685, The Pentagon, Washington, D. C. 20301

13. ABSTRACT

The SATAN II System Description (SD) provides a description of the SATAN II Model and its operations.

SATAN II is a model for the two-sided, open play of a tactical nuclear weapons conflict on simulated battlefields. When provided by the user with descriptions of the engaging forces, rates of target acquisition, and a nuclear weapons employment doctrine, the SATAN II computer programs will automatically:

    Establish the battle area
    Deploy the forces
    Determine necessary reaction for actions taken
    Acquire targets
    Allocate nuclear weapons to fire on those targets
    Assess the effects of those fires
    Move the Forward Edge of Battle Area (FEBA)
    Automatically interface with ATLAS (A Tactical, Logistical, and Air Simulation).

The SATAN II Model is programmed in FORTRAN IV for use on the IBM 360/50/65 computer.

DD FORM 1473, REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

PRICES SUBJECT TO CHANGE   CH-3

7O

KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
SATAN II						
ATLAS						
Nuclear						
Tactical Nuclear Conflict						
Assessment						
Target						
Acquisition						
Model						
Computer						
Conflict						
FEBA Movement						

EFFECTIVE PAGES - 1 March 1975

This list is used to verify the accuracy of CSM SD 133-72 after change 3 pages have been inserted. Original pages are indicated by the letter 0, change 1 pages by the numeral 1, change 2 pages by the numeral 2, and change 3 pages by the numeral 3.

Page No.	Change No.	Page No.	Change No.
Title Page	0	108	3
ii	2	109-110	0
iii	0	111-113	1
iv	0	114-118	0
v	0	119	1
vi	2	120	0
vii	0	121	1
viii	2	122-131	0
ix	1	132	1
1	2	133	0
2-20	0	134	1
21	3	135-136	0
22-24	0	137	2
25	1	138	0
26-35	0	139-140	1
36	1	141-160	0
37-58	0	161	1
59-62	1	162-164	0
62.1-62.2	1	165	1
63-65	1	166	0
65.1-65.2	1	167-170	1
66	1	171-176	0
67	3	177	3
67.1-67.2	3	178	0
68-69	1	179	1
69.1-69.2	1	180	2
70-71	1	181	1
71.1-71.2	1	182	3
72	1	183-188	1
72.1-72.2	1	189-193	0
73-76	1	194	3
76.1-76.2	1	195-197	0
77-78	1	198	1
78.1-78.2	1	199-204	0
79-81	1	205-206	1
81.1-81.2	1	207	3
82-84	0	208	1
85-86	1	209-214	0
87-89	0	215-216	1
90	3	217-219	0
91-107	0	220-221	3

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Page No.	Change No.	Page No.	Change No.
222-226	0	317-318	0
227	3	319-320	1
228	1	321-322	0
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233-234	1	325-326	0
235	3	327-328	1
236-237	1	329-330	0
238-253	0	331-332	1
254-257	1	333-334	0
258	2	334.1-334.32	2
258.1	2	335-336	0
259	0	337	1
260	3	339	3
261-262	0	340	1
263	3		
264	0		
265-267	1		
268	0		
269	1		
270	0		
271	1		
272-275	0		
276-277	1		
278	0		
279	1		
279.1-279.2	1		
280	0		
281	1		
282-284	0		
285	1		
286	3		
287-288	0		
289	3		
290	0		
291-293	1		
294-296	0		
297	1		
297.1-297.2	1		
298-299	0		
300	1		
300.1-300.2	1		
301-302	0		
303	1		
304-305	0		
306-312	1		
313-314	0		
315-315	1		

an "All Go" (full scale) exchange. In SATAN II, after
entering the last piece of meaningful data on a line, all
following "0" data values on that line may be omitted. Two
hundred decisions (DECISN) may be entered and up to 50
responses (ACTION) specified.

TARGET ACQUISITION PROCEDURE

The acquisition of a target, as treated in the SATAN II Model,
implies that enough information concerning an opposing target
has been received, processed, and analyzed so that the target
has been identified and its apparent position computed with
sufficient accuracy to permit the planning of fire missions.
Error in known target position is gamed. This error describes
a circle around the target within which the apparent target
location will be located 50 percent of the time. If the
error is to be applied, the computed apparent location is
carried forward in the event list instead of the actual tar-
get location. The acquisition procedure creates a list of
targets that can be fired upon.

Simulation of Target Acquisition

At the beginning of each hour of simulated conflict a
probability of acquisition is applied to each of the targets
that is not currently acquired. A random number is chosen
and compared with this acquisition probability. If the num-
ber is greater than the acquisition probability, the target
is not acquired. If the number is less than or equal to
the acquisition probability, the target is acquired. Once
a target has been acquired the next step is to assign a time
of acquisition. The assumption is made that the target could
have been acquired with equal probability at any minute during
the hour, and the time of acquisition is assigned by randomly
selecting a minute within the coming hour. The next step
determines the length of time, in minutes, that the target
will remain acquired. A random selection from a list of
acquisition duration times is made, and an acquisition dura-
tion time is associated with the target. The end product of
the entire process is a list of targets that have been acquired,
with a time and a length of acquisition automatically assigned
to each of the acquired targets.

Determination of the Acquisition Probability

The player, using input data (ACQFAC array), creates up to five acquisition zones on each side of the FEBA. He states, for example, that Blue acquisition zone 1 will cover the Red force area from the FEBA to 3 kilometers to the rear, acquisition zone 2 will cover the area from 3 to 8 kilometers from the FEBA, etc. Then for each target type by zone the player inputs a basic rate of acquisition which reflects the probable percentage of targets of this type in that zone that will be acquired in an hour. If the basic acquisition probability applied by Blue forces to Red targets in acquisition zone 1 is input as 10 percent, for example, Blue will acquire about 10 percent of the Red target types in zone 1 each hour. This does not mean, however, that at the end of 10 hours Blue will have acquired all of the Red target types in zone 1, since targets are "lost" for various reasons, as is explained in a following section.

This basic probability of acquisition by target type and zone can be modified by factors for darkness, terrain, and weather. The player can input values for each of these factors that will degrade the basic target acquisition probability simulating conditions of decreased visibility.

To sum up, the probability of acquiring a target is determined by means of the formula:

Acquisition probability = basic probability of the target's type for the zone in which the target is located x darkness factor x terrain factor x weather factor

At the player's option, all, some, or none of the modifying factors can be used.

Determination of Target Duration Times

When a target is acquired, the length of time it will remain acquired is determined. The model requires that the player input four points representing a distribution of duration times for each acquisition zone of each side. Each time a target is acquired, the duration times for the zone in which the target is located is entered at random and a duration time obtained. This duration time can be modified, at the player's option, by a target-type factor similar to that described in the section on acquisition probabilities.

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REPORT 04 (Fire Report) (continued)

Print Field	V-Number	Item	Description
15	V13	RPLCHN	The launcher number within unit of the launcher firing on this target
16	V18	RPLXCO	The X-coordinate, in 10's of meters, of the AGZ for this fire
17	V19	RPLYCO	The Y-coordinate, in 10's of meters, of the AGZ for this fire
18	V14	RPWSYS	The weapon system type of the weapon utilized against this target
19	V15	RPYELD	The yield, in kilotons, of this weapon system
20	V22	RPDHOB	Desired HOB (0/low, 1/high)
21	V33	RPAHOB	Actual HOB, in meters
22	V34	RPTRND	Total rounds scheduled to be fired
23	V35	RPCRND	Current round fired
24	V23	RPRADE	Radius of effect for prompt casualties to protected personnel
25	V21	RPPPAM	Preplanned fire marker (0/no, 1/fire at target or specified coordinates, 2/fire at target complex, 6/fire at barriers)
26-27			Not used
28	V24	RPFABR	Reason for failure (0 or 1/successful, 2/normal fire abort, 3/air weapon abort, 5/air sorties lost pre-target, 9/air weapon successful, sortie killed post-target, 11/air weapon abort, sortie killed post-target, 13/delayed fire report because of decision)

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REPORT 04 (Fire Report) (continued)

Print Field	V-Number	Item	Description
29	V25	RPPERS	Weapon system (1/Ground, 2/Air, 3/ADM)
30-35			Not used

REPORT 05 (Damage)

Print Field	V-Number	Item	Description
1	V01	RPTIME	Cycle time, in minutes
2	V02	RPCODE	Report code 5
3	V03	RPSIDE	Numerical designation of this target's side (1/Blue, 2/Red)
4	V04	RPSECT	The numerical designation of the sector in which this target is located
5	V06	RPDPAR	The numerical designation of the deployment area in which this target is located
6	V05	RPZONE	Target zone
7	V07	RPTLVL	This target's unit echelon level
8	V08	RPTUNT	The numerical identification of this target's unit
9	V09	RPTGTN	This target's number within unit
10	V10	RPTTYP	This target type
11	V16	RPTXCO	Target X-coordinate, in 10's of meters, actual location
12	V17	RPTYCO	Target Y-coordinate, in 10's of meters, actual location
13	V11	RPLLVL	The launcher's (firing on this target) unit echelon level
14	V12	RPLUNT	The launcher's (firing on this target) unit identification
15	V13	RPLCHN	The launcher's (firing on this target) number within unit
16	V18	RPLXCO	The X-coordinate, in 10's of meters, of the launcher
17	V19	RPLYCO	The Y-coordinate, in 10's of meters, of the launcher

ACQFAC Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is ACQFAC
Indices			
Zone 10	1	5	The numerical identification of this zone
Side 14	1	2	The numerical identification of this side (1/Blue, 2/Red)
Degradation Factors for:			
Weather 20-23	0.00	1.00	Degradation to acquisition probability for current weather conditions
Terrain 25-28	0.00	1.00	Degradation to acquisition probability for terrain
Darkness 30-33	0.00	1.00	Degradation to acquisition probability for darkness
Duration Loss Time			
Five Percent Loss 40-43	0	2880	Number of minutes of duration after which five percent of the acquired targets will have been lost
20 Percent Loss 45-48	0	2880	Number of minutes of duration after which 20 percent of the acquired targets will have been lost

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ACQFAC Items (continued):

Heading & Columns	Min Entry	Max Entry	Description
50 Percent Loss 50-53	0	2880	Number of minutes of duration after which 50 percent of the acquired targets will have been lost
100 Percent Loss 55-58	0	2880	Number of minutes of duration after which all of the acquired targets will have been lost
Zone Distance 60-65	0	300000	The distance from FEBA to rear boundary of this zone, in 10's of meters*
Circle Probable Error 67-71	0.00	10.00	Modification factor for Circular Probable Error (CPE). If applicable, this factor will modify the CPEL about the target location, from TRCHAR array (1.00 if unaltered basic error is to apply)

(A sample ACQFAC input form is in figure 31.)

*Enter zero in these columns for the fifth zone. The distance will be computed by the model automatically.

Instructions for Preparing BARLST Array

1. Enter in columns 1-6 the array name BARLST.

2. Enter in columns 8-10 the barrier number. Cards should be numbered sequentially, beginning with 1.

3. Enter in column 20 the side on which this barrier is located using 1 for Blue and 2 for Red.

4. Enter in columns 22-23 the sector in which this barrier is located.

5. Enter in columns 25-26 the number of points in this barrier.

6. Enter in column 28 the code specifying the side this barrier will impede when in its positive status. Use a 0 if neither side, 1 for Blue, 2 for Red, 3 for both.

7. Enter in column 30 the barrier's initial status; 0 indicates a negative or non-impeding barrier, and 1 indicates a positive or impeding barrier.

8. Enter in columns 32-33 the minimum number of points which must be broken to reverse the status of the barrier.

BARLST Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is BARLST
Index 8-10	1	200	Barrier number
Side 20	1	2	Barrier side (1/Blue, 2/Red)
Sector 22-23	1	10	Sector in which barrier is located
Points 25-26	1	50	Number of points in this barrier
Impede 28	0	3	Side which will be impeded by this barrier, if any (0/neither, 1/Blue, 2/Red, 3/both)
Condition 30	0	1	This barrier is negative or positive (0/negative, 1/positive)
Point to Break 32-33	1	50	Number of points which, if broken, will reverse the condition of the barrier

(A sample BARLST input form is in figure 35.)

MOVRAT Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is MOVRAT
Index 9-10	1	10	The sequential line number
Move Rate 20-21	0	32	The move rate, in kilometers per day
Ratio 23-26	1.00	8.00	Ratio of current absolute personnel strength of attacker versus defender side

(A sample MOVRAT input form is in figure 51.)
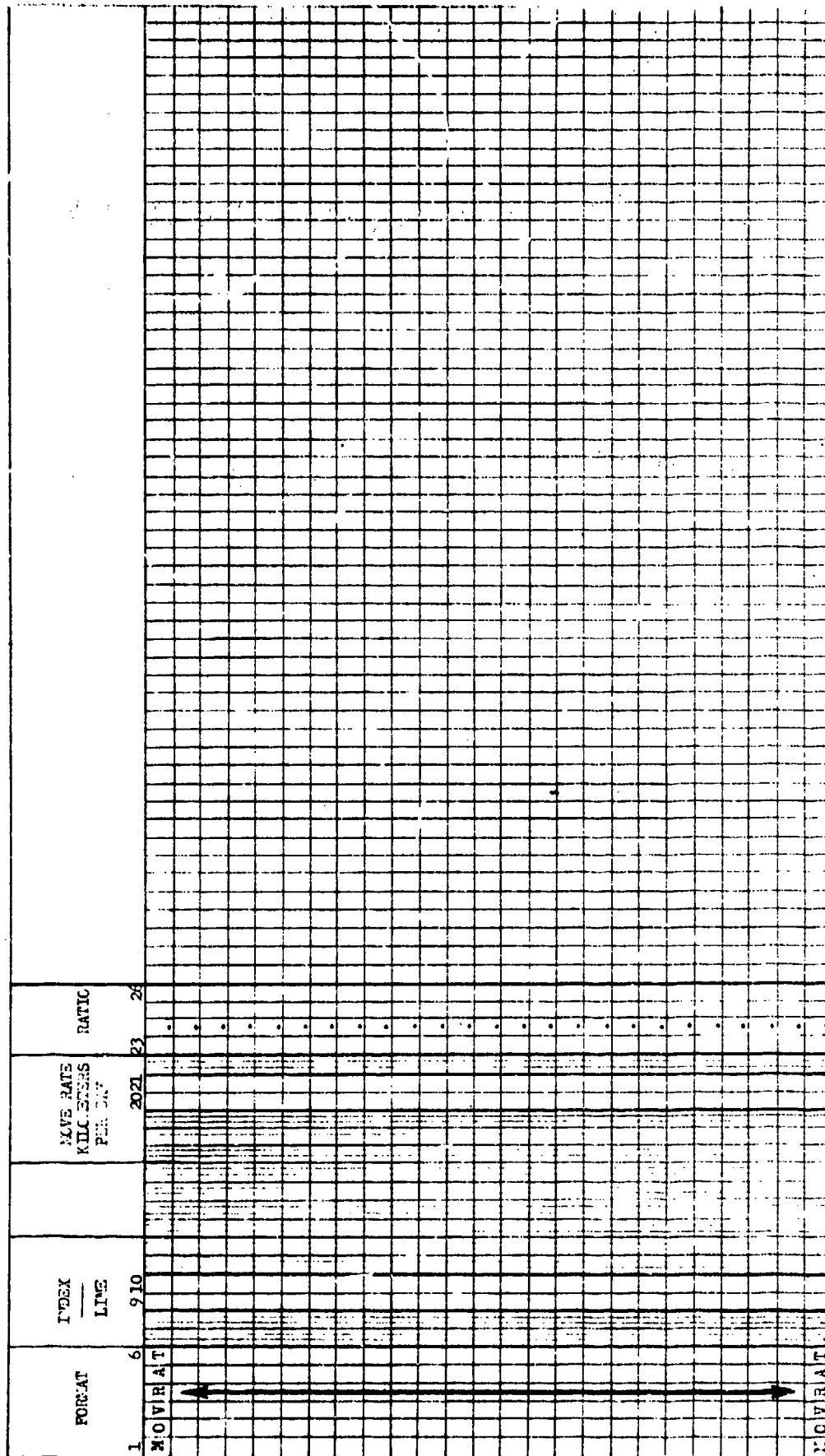
MOVRAT

STEP II

MOVEMENT RATE (MOVRAT)

Figure 51. Sample MOVRAT Input Form

Instructions for Preparing PREPLN Array (continued)

14. Enter in columns 63-68 the X-coordinate, in 10's of meters, if this fire is at a coordinate. If not, enter 0 in column 68.

15. Enter in columns 70-75 the Y-coordinate, in 10's of meters, if this fire is at a coordinate. If not, enter 0 in column 75.

16. Enter in columns 77-79 the barrier number for which this ADM is intended.

PREPLN Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is PREPLN
Index 8-10	1	200	The sequential line number
Side 20	1	2	The numerical identification of the target's side (1/Blue, 2/Red)
Sector 22-23	1	10	The sector number
Time of Fire 25-28	1	1440	Time of fire, in minutes, from start of cycle
Launcher Type 30-32	1	100	The launcher type
Weapon System 34-35	1	50	The weapon system type
Yield 37-43	0.01	2000.00	The weapon yield, in kilotons
HOB 45	0	1	Height of Burst (0/low, 1/high)
Target			If preplanned fire at coordinates, these entries will be zero
Unit 47-49	0	400	Target unit identification number
Number 51-53	0	400	Target number within unit
Type 55-57	0	200	Target type

UNIT - STUNIT ARRAY

The STUNIT array provides data describing each division, corps, and army in the game. The data includes unit identifiers, personnel data, and off-target personnel and truck data.

The unit is identified by a unit identification number; echelon level of army, corps, or division; side; and sector to which it is assigned.

The units authorized as well as initial personnel strength define the overall capability of the unit. A percentage of casualties which would cause the unit to withdraw is included.

While most personnel and equipment are considered to be assigned to targets and target complexes, it is recognized that a unit may have additional personnel and trucks that are not so disposed. These items are reflected in STUNIT as numbers of off-target personnel and trucks and are assumed to be uniformly distributed throughout the unit's area of responsibility.

One deck of STUNIT cards must be prepared for each SATAN II game. Each card in the deck carries the data relating to one unit.

Instructions for Preparing STUNIT Array

1. Enter in columns 1-6 the array name STUNIT.

2. STUNIT is indexed by unit number. Enter in columns 8-10 the numerical designation of the unit for which the data of this entry applies.

3. Enter in column 20 the echelon level of this unit.

4. Enter in column 22-23 the sector in which this unit is assigned.

5. Enter in column 25 the side (1/Blue, 2/Red) to which this unit is assigned.

6. Enter in columns 27-32 this unit's Table of Organization and Equipment (TOE) strength.

7. Enter in columns 34-36 this unit's percent of TOE strength at the start of the game.

8. Enter in columns 38-40 the percent of casualties to TOE strength above which this unit will be withdrawn.

9. Enter in columns 42-47 the number of personnel considered as off-target personnel.

10. Enter in columns 49-52 the number of trucks considered to be off-target.

TCLASS Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is TCLASS
Index 8-10	1	600	The sequential line number
Class 20-22	1	200	This entry's target class
Level 24	0	3	The weapon system echelon level that may be committed against this target (0/air, 1/division, 2/corps, 3/army)
Launcher 26-28	1	100	The desired launcher type that may be committed against this target class
Weapon 30-31	1	50	The desired weapon system number to be utilized against this target class
Yield 33-39	0.01	2000.00	Weapon yield, in kilotons
Maximum Rounds 41	1	8	The maximum number of rounds to be fired at this target class
Minimum Rounds 43	1	8	The minimum number of rounds acceptable against this target class

(A sample TCLASS input form is in figure 58.)

SAM II

TARGET CLASSES (TCLASS)

FORMAT	INDEX LINE			CLASS	WP'. SYS. FCH. LEVEL	LAUN-CHER TYPE	WP'. SYS.	YIELD KILOTONS	ROUNDS	
									MAX.	MIN.
1	6	8	10	20	22 24	26 28	30 31	33	39 41	43
T C L A S S										
T C L A S S										

Figure 68. Sample TCLASS Input Form

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Instructions for Preparing THEATR Array

1. Enter in columns 1-6 the array name THEATR.

2. Enter in column 10 the sequential line number of this line.

3. Theater coordinates that define the field of operations are defined by their right and left front and right and left rear coordinates. These coordinates are those determined by a player standing within the Blue side of the theater facing the FEBA. Blue side is always the side closer to the X-axis. Enter in columns 20-25 the X-coordinate of the right front corner, in 10's of meters.

4. Enter in columns 27-32 the Y-coordinate of the right front corner of the theater, in 10's of meters.

5. Enter in columns 34-39 the X-coordinate of the left front corner of the theater, in 10's of meters.

6. Enter in columns 41-46 the Y-coordinate of the left front corner of the theater, in 10's of meters.

7. Enter in columns 48-53 the X-coordinate of the right rear corner of the theater, in 10's of meters.

8. Enter in columns 55-60 the Y-coordinate of the right rear corner of the theater, in 10's of meters.

9. Enter in columns 62-67 the X-coordinate of the left rear corner of the theater, in 10's of meters.

10. Enter in columns 69-74 the Y-coordinate of the left rear corner of the theater, in 10's of meters.

11. Enter in columns 76-77 the total number of sectors that will be assigned. Sectors are numbered from left to right as you stand on the Blue side facing the FEBA.

THEATR Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is THEATR
Index 10	N/A	1	Line number
Theater Coordinates			Right and left front, right and left rear theater coordinates are those positions determined by a player standing within the Blue side of the theater facing the FEBA
X-Right Front 20-25	0	300000	X-coordinate of theater right front corner, in 10's of meters (point C)
Y-Right Front 27-32	0	300000	Y-coordinate of theater right front corner, in 10's of meters (point C)
X-Left Front 34-39	0	300000	X-coordinate of theater left front corner, in 10's of meters (point D)
Y-Left Front 41-46	0	300000	Y-coordinate of theater left front corner, in 10's of meters (point D)
X-Right Rear 48-53	0	300000	X-coordinate of theater right rear corner, in 10's of meters (point B)
Y-Right Rear 55-60	0	300000	Y-coordinate of theater right rear corner, in 10's of meters (point B)

(See figure 5, page 16.) 220

THEATR (continued):

Heading & Columns	Min Entry	Max Entry	Description
X-Left Rear 62-67	0	300000	X-coordinate of theater left rear corner, in 10's of meters (point A)
Y-Left Rear 69-74	0	300000	Y-coordinate of theater left rear corner, in 10's of meters (point A)
Number of Sectors 76-77	1	10	The number of sectors in theater

(A sample THEATR input form is in figure 63.)

SAFAR II

THEATER COORDINATES (THEATR)

THEATER COORDINATES IN 10'S OF METERS

| LEFT FRONT | | RIGHT FRONT | | LEFT FRONT | | RIGHT REAR | | LEFT REAR | | NO. OF SEC-TORS |
| X | Y | X | Y | X | Y | X | Y | X | Y | |

Figure 63. Sample THEATR Input Form

TARGET CHARACTERISTICS - TRCHAR ARRAY

The TRCHAR array provides the attributes for each target type in a game. Each target is described primarily by its target type. The characteristics of a target that are included are its size; number, posture style, and casualty limit of its personnel; numbers and types of equipment; its nuclear capability, if any; intelligence factors, and a grouping by functions for bargraph purposes.

A target is considered a circular area; TRCHAR provides the radius for each target type.

The number of personnel is given as an absolute number; the posture of these is given by reference to a posture as described in the TPRDIS array. The casualties which, when sustained, prevent further operation of the target is given as a percentage of full target personnel strength.

The equipment assigned to the target is spelled out as the number of tanks, APC's, conventional artillery, aircraft, SAM's, and trucks. Also, if it has a nuclear capability, the type of launcher is listed. A given target may have only one nuclear launcher.

The intelligence factors give the values to be used in determining the errors in locating and assessing damage to the target.

Target types carry a reference to the target's function which may be maneuverable, artillery, reserve, or other. This reference is for plotting only.

One deck of TRCHAR cards must be prepared for each SATAN II game. Each card in the deck carries the data relating to one target type.

Instructions for Preparing TRCHAR Array

1. Enter in columns 1-6 the format name TRCHAR.

2. Enter in columns 8-10 the target type. TRCHAR is indexed on this element.

3. Enter in columns 20-24 this target type's radius, in meters.

4. Enter in columns 26-29 the number of personnel assigned to this target type.

5. Enter in columns 31-33 the number of tanks assigned to this target type.

6. Enter in columns 35-37 the number of APC's assigned to this target type.

7. Enter in columns 39-41 the number of conventional artillery pieces assigned to this target type.

8. Enter in columns 43-45 the number of aircraft assigned to this target type.

9. Enter in columns 47-49 the number of surface-to-air missiles assigned to this target type.

10. Enter in columns 51-53 the number of trucks assigned to this target type.

11. Enter in columns 55-57 the percent of personnel casualties which when sustained, causes this target type to cease to function.

12. Enter in columns 59-60 the personnel posture pointer to a line of the TPRDIS array.

13. Enter in columns 62-64 the nuclear launcher type, if any, for this target type. The launcher type must have been defined in the array CWCHAR.

14. Enter in columns 66-69 the intelligence parameter CPEL, in meters, for this target type. The CPEL is the radius of a circle with its center at the given target location. The CPEL is associated with a dispersion of apparent locations around the given location which fall in a normal distribution pattern. This means that the apparent

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WPCHAR Items:

Heading & Columns	Min Entry	Max Entry	Description
Format 1-6	N/A	N/A	The card format name is WPCHAR
Index			
Weapon Type 9-10	1	50	The numerical identification of the weapon system
Abort 20-22	0	100	Percent abort rate. If ADM, rate will include failure to set ADM
Range			
Minimum Range 24-29	0	100000	Minimum range, in 10's of meters
Maximum Range 31-36	0	100000	Maximum range, in 10's of meters
CEP			
Mid 38-41	0	1000	CEP mid-range, in meters
Long 43-46	0	1000	CEP long-range, in meters
Air System 48	0	1	Air weapons system (0/no, 1/yes)
Time			
Reload 50-52	0	100	Time, in minutes, to reload launcher. For multifire air weapons, time will be elapsed time between releases

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WPCHAR Items (continued):

Heading & Columns	Min Entry	Max Entry	Description
Switch 54-56	0	100	Time, in minutes, to switch warhead. Entry will be zero for air weapon systems
Normal 58-60	0	300	Normal time to fire, in minutes. Entry will be minutes t arrive over target for a weapon systems
PEh			
Mid 62-64	0	300	PE_h mid-range, in meters
Max 66-68	0	600	PE_h max-range, in meters
ADM 70	0	1	ADM marker (0/no, 1/yes)

(A sample WPCHAR input form is in figure 66.)

CH-1

Creates a geographic unit plot depicting the area
of the user-specified unit and relevant theater
and unit information.

QUERY

The QUERY program retrieves and summarizes data from the
SATAN II output (SIMOUT, MODOUT). The retrieval
criteria is specified by the user on punched cards.
Several different card forms are used to describe stylized
requests:

Select data according to numerical limits

Print data by type and item

Tally data according to numerical limits

Sort the printed lines of output by up to 10
different key data items

Subtotal data by sort key categories

Generate items by arithmetic combinations of
subtotals and other generated items.

The QUERY program produces printed reports. The contents
of these reports are controlled by the different card forms
input by the user. It takes several card forms to describe
the specifications for one report. The program processes
the entire SATAN II output tape to produce one report. As
many reports as desired may be requested on one computer
run. Multiple reports are generated sequentially and are
independent of each other.

OUTSRT (Output Processor)

OUTSRT reads user control cards and an input game tape
(TRNOUT, SIMOUT, MODOUT). Sorts relevant information
according to user specifications and generates four
summary reports depicting the final status of the related
game cycle.

CH-3

GENHOB

GENHOB is a routine whose only function is to precompute
the values for and produce the HOBRAD array for SATAN II.
The array POINTS is prepared from data listed in FM 101-
31-2 (ref. 1) as input to GENHOB. Values produced by
GENHOB represent a condensed version of the weapons radii
of effects listed in FM 101-31-2 (ref. 1).

DECK CONFIGURATION FOR SATCON (Executive Control)

There are 24 possible control cards in the set for executive
control. Each card contains the name of the pertinent sub-
system, the control card name, and one data item. Each con-
trol card, except classification, has a default value that
will be assumed if that specific control card has not been
input. Control cards may be input in any order. Each card
will be discussed individually as to its contents and its
relationship to other control cards. This set of control
cards is followed by the terminator END DATA. In addition,
the executive control program needs two input arrays CACTON
(page 110) and CDECSN (page 131) which control the system
flow in and out of SATAN and ATLAS. These two tables are
also followed by an END DATA control card.

SATCON Control Cards

The SATCON control cards provide those constants required
by individual modules. The card format is standard. Numeric
entries must be right justified and alphabetic entries left
justified.

Constants required for each module are listed below. Enter
only those constants required for the module to be executed.

Module	Constant	Description
SATCON	CLASSI	Classification (CLASS. CON-FIDENT, SECRET, TOP SECRET)
	VERSON	Version name for this game
	ATDAYS	The maximum number of ATLAS days to be played
	STHOUR	The maximum number of SATAN II hours to be played

REPORT TYPE Card

The user specifies by one control card which of the
15 possible REPORT arrays will be the basis of this
output report. Only <u>one</u> report type may be specified
on a REPORT TYPE control card. The card format is as
follows:

<u>Columns</u>   <u>Contents</u>

1-11   REPORT TYPE

19-20   Report type number, any integer 1 through
              11, 13, 15, 16, or 21, right justified

SELECT ITEM Card

The selection of data for retrieval is controlled by
one or more SELECT ITEM cards. By means of these cards
the user formulates his query. A query is made up of
one or more simple or compound conditions, each of which
in turn may be made up of one or more simple conditions.

A simple condition is a single statement such as
"Is variable three greater than 27?" or "Is variable
five equal to 61?"

Compound conditions are a series of simple conditions
connected by the word "and." For example, the above
simple conditions may be joined to give the compound
condition: "Is variable three greater than 27, and
is variable five equal to 61?"

A query is made up of one or more simple or compound
conditions joined by the word "or." An example of
a query is: "Is variable three greater than 27 and
is variable five equal to 61; or is variable seven
less than 121?"

The relationship between the variable and the limit
value is represented by two-letter abbreviations.
There are only six allowable combinations. They are:

Relationship Abbreviation	Meaning
EQ	Equal to
NE	Not equal to
LT	Less than
GT	Greater than
LE	Less than or equal to
GE	Greater than or equal to

No more than 100 simple conditions may be used in making up one compound condition.

No more than 100 simple conditions may be used in all compound conditions of a single query.

The number of compound conditions must not exceed 100.

Each SELECT ITEM card contains one simple condition.

The card format is as follows:

Columns	Contents
1-11	SELECT ITEM
15-16	Compound condition number, right justified. The connection by the word "and" of simple conditions on separate cards is accomplished by giving them each the same condition number. The connection by the word "or" is different condition numbers
20	If a count of all records retrieved by the specified criteria is desired, enter 1. Otherwise leave blank.
22	V
23-24	Variable number, right justified, which is the subject of the simple condition. Page 286 lists the variable (V) numbers associated with the name of an item in a REPORT array